

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA**

STATE OF OKLAHOMA,)	
)	
Plaintiff,)	
)	
v.)	Case No. 05-cv-329-GKF(PJC)
)	
TYSON FOODS, INC., et al.,)	
)	
Defendants.)	

**STATE OF OKLAHOMA'S REPLY IN FURTHER SUPPORT OF
ITS MOTION IN LIMINE TO PRECLUDE EXPERT TESTIMONY
OF DEFENDANTS' WITNESS TIMOTHY SULLIVAN, Ph.D. [DKT #2071]**

Plaintiff, the State of Oklahoma ("the State") submits this reply in further support of its motion in limine to preclude the testimony of Defendants' witness Timothy Sullivan, Ph.D.

I. Argument

A. Defendants do not demonstrate that Dr. Sullivan is qualified to opine on the trophic status of Lake Tenkiller

The State has moved to exclude the testimony of Dr. Sullivan concerning the trophic status of Lake Tenkiller on the grounds that he lacks the qualifications, knowledge and experience to testify as an expert regarding eutrophication of lakes and reservoirs. *See* Motion, pp. 5-7. In response, Defendants take the inexplicable position that Dr. Sullivan's discussion of the trophic status of Lake Tenkiller does not constitute an opinion. *See* Resp., p. 4 (asserting Dr. Sullivan "does not issue any opinions concerning the trophic state of Lake Tenkiller . . ." and ". . . his references to the trophic state of Lake Tenkiller are simply included in his report as the basis of his discussion of the chemical concentrations of water within Lake Tenkiller").

Notwithstanding Defendants' assertions, it is clear that Dr. Sullivan is attempting to offer an opinion on the trophic status of Lake Tenkiller. *See* Ex. 1 (Rpt. at 89 & Fig. 15-3) (reviewing only a portion of P data and opining that "[p]hosphorus concentrations in recent years place Lake Tenkiller in the mesotrophic class and show a dramatic decrease (by more than 50%) in the total P concentration compared with earlier years").¹ Dr. Sullivan, however, does not possess the qualifications, knowledge or experience to form and offer such an opinion.

¹ Defendants assert that Dr. Sullivan did not classify Lake Tenkiller's trophic status himself, but was simply relying on Figure 7 of the Cooke and Welch Report and that this figure shows Lake Tenkiller is mesotrophic. *See* Resp., p. 8 & fn 3. This is not accurate. Figure 7 of the Cooke and Welch Report does not contain all of the analysis and data considered by Cooke and Welch in reaching their conclusions about the trophic status of Lake Tenkiller, nor does it reflect that Lake Tenkiller is mesotrophic. *See* Resp., Ex. 7. For example, based on phosphorus data only, Lake Tenkiller is shown in Figure 7 as eutrophic from 1974 to 1991, borderline eutrophic/hypereutrophic in 1993, hypereutrophic in 2005 and 2006, and eutrophic in 2007. *See*

Although Defendants argue that Dr. Sullivan's expertise (or more appropriately, lack of expertise) on eutrophic conditions is irrelevant, they present nonetheless extensive argument regarding his purported experience in limnology. *See* Resp., p. 9.² The inescapable fact, however, is that Dr. Sullivan has never conducted research on eutrophication or determined the trophic status of a lake or reservoir; he has only summarized the work of others on eutrophication issues in lakes for a national survey based on publications. *See* Ex. 2 (Sullivan Dep., 140:24-141:2).³ Thus, Dr. Sullivan is simply not qualified to render any opinions on the trophic status of Lake Tenkiller. Because Dr. Sullivan is not qualified to render an opinion on the trophic status of Lake Tenkiller (and according to Defendants, is not actually rendering such an opinion) his opinion that conditions in Lake Tenkiller are not deteriorating should also be excluded as it is based on his inadmissible "statement" regarding the trophic status of Lake Tenkiller.⁴

id. As Defendants acknowledge, phosphorus concentrations are only one indication of the trophic status of a lake and Dr. Sullivan looked at those levels only for "certain years." *See* Resp., p. 7. Further, Dr. Cooke and Welch actually conclude based on their review of a broad range of data that Lake Tenkiller became eutrophic in 1986 and remained so through 2007 with one exception due to drought. *See* Ex. 3 (Cooke/Welch Rpt., p. 1). They further conclude that the upper reservoir area was hypereutrophic in 1986 and remained so through 2007 and the lower area was mesotrophic during droughts and eutrophic during non-droughts. *See id.*

² While acknowledging that Dr. Sullivan is not a limnologist and does not possess a degree in limnology, *see* Resp., p. 5, Defendants provide an extensive description of Dr. Sullivan's publications they claim are related to limnology. However, not one of them contains research conducted by Dr. Sullivan in which he determined the trophic status of a lake or reservoir.

³ Confirming his lack of expertise, he does not know how the State of Oklahoma typically evaluates water quality in lakes with reference to sampling locations or the number of samples. *See* Ex. 2 (Sullivan Dep., 472:9-18). When he was asked whether EPA used multiple sampling locations in site specific studies of eutrophication, Dr. Sullivan testified "I can't tell you for sure." *See id.* (at 479:12-21). And when asked whether he evaluated Areal Hypolimnetic Oxygen Deficit in Lake Tenkiller he testified "I've seen reference to that in other reports. It's not something I know anything about." *See id.* (at 480:1-12).

⁴ The total absence of any scientific rigor behind Dr. Sullivan's conclusory statement is exemplified by his testimony that he "didn't do a lot with Lake Tenkiller." *See* Ex. 2 (Sullivan Dep., 469:3-4). While his report states that phosphorus levels in Lake Tenkiller appear to have decreased at LK-01 and LK-02 in recent years based on data from Drs. Cooke and Welch, Dr. Sullivan testified that he did not actually do any analysis of the phosphorus data from LK-02 and

B. Defendants' arguments do not demonstrate that Dr. Sullivan's opinions regarding phosphorus and bacteria runoff are reliable or supported by data, analysis and testing

The State seeks to exclude Dr. Sullivan's opinions on runoff of phosphorus and bacteria because they are not based on reliable data, analysis or testing. With regard to phosphorus and bacteria, Dr. Sullivan opines that "it is **unlikely** that land application of poultry litter is an **important source** of these constituents to streams in the watershed." *See* Ex. 1 (Sullivan Rpt., p. 80) (emphasis added). Dr. Sullivan believes that "current national and also Oklahoma and Arkansas State guidelines and regulations discourage or prohibit the spreading of poultry litter on pasture lands in the IRW in areas likely to be hydrologically active and at times when runoff is most likely to occur, thereby minimizing the possibility of stream water contamination."⁵ *See*

did not know whether conditions at LK-02 were better or worse than they were historically. *See id.* (at 470:17-19; 475:18-476:3). Further, Dr. Sullivan did not analyze any data from the two other sampling stations at LK-03 and LK-04, despite the fact that he acknowledged that other sampling stations are relevant and that water quality conditions would differ at the different sampling stations and thus data from one station would not accurately reflect water quality at another. *See id.* (at 471:19-21; 472:2-5; 472:19-473:3). Dr. Sullivan does not know whether total phosphorus conditions in Lake Tenkiller represented at stations LK-03 and LK-04 are better or worse than they were historically. *See id.* (at 476:23-477:6). In his deposition, Dr. Sullivan was unable to offer any opinions on the trophic status of Lake Tenkiller in the portions of the lake represented by the LK-02, LK-03 and LK-04 sampling stations. *See id.* (at 483:6-19, 483:23-484:10). Thus, Dr. Sullivan only reviewed the phosphorus data for one sampling station in Lake Tenkiller, LK-01, and concluded the lake was mesotrophic and not deteriorating. Dr. Sullivan initially defended his decision to rely on only one of the four lake sampling stations by citing to the EPA requirements but, upon further examination, he could not provide a citation to any reference that would support that statement and testified that the "general feeling" is to sample the deepest part of the reservoir and "[t]hat would not be something that I could necessarily derive from EPA" *See id.* (at 475:8-11; 477:7-11; 477:23-478:4). The only other basis for his opinion that water quality in Lake Tenkiller has not deteriorated is a vague reference to the expert report of another of Defendants' experts, Dr. Horne. Specifically, Dr. Sullivan states that Dr. Horne "presented data illustrating that chlorophyll *a* stayed about the same during recent decades. Thus, the claim by Cooke and Welch (2008) that P and chlorophyll *a* are increasing is inconsistent with the available data." *See* Ex. 1 (Sullivan Rpt., p. 92).

⁵ Neither Defendants nor Dr. Sullivan cite to a single reference in support of their assertion that any "guidelines and recommendations" applicable in the IRW prohibit land application of poultry waste in "areas likely to be hydrologically active."

Ex. 1 (Sullivan Rpt., p. 78). The basis for his opinion on the likelihood of phosphorus and bacteria runoff is his "general sense" that the majority of the land area in the IRW would not have appreciable runoff, but he has not done any analysis to determine that. *See* Ex. 2 (Sullivan Dep., 348:21-350:21). Contrary to Defendants' characterization of Dr. Sullivan's opinion, Resp. pp. 9-11, Dr. Sullivan's testimony was in response to questions relating to his opinions that phosphorus and bacteria runoff in the IRW is unlikely to be an important source of pollution. *See id.*

The simple fact of the matter, however, is that Dr. Sullivan has no familiarity with applicable regulations and guidelines in the IRW.⁶ Dr. Sullivan's vague and uncertain beliefs⁷ about "guidelines and regulations," are not sufficient to support his opinion regarding the likelihood of poultry waste being an important source of pollution in the IRW. *See Daubert v.*

⁶ Dr. Sullivan does not even know which laws and regulations apply to Defendants' poultry operations in Arkansas and Oklahoma. He did not review the Oklahoma Registered Poultry Feeding Operations Act and associated regulations and believes NRCS Code 590 for Oklahoma and the federal EPA CAFO Rules are the regulations for the State of Oklahoma. *See* Ex. 2 (Sullivan Dep., 166:17-171:7). With regard to Arkansas, Dr. Sullivan believes the regulations are the EPA CAFO rules, NRCS Code 590, a joint agreement between EPA and USDA, Arkansas Acts 1059 and 1061, and NRCS Code 633 and 393. *See* Ex. 2 (Sullivan Dep., 172:12-173:20). As the Court is aware, there are a number of laws and regulations applicable to the Defendants' poultry operations in Arkansas and Oklahoma that are not included in Dr. Sullivan's list. Further, no party has contended that the EPA CAFO rules apply to the operations that are the subject of this action. Underscoring his lack of familiarity with the applicable laws and regulations, Dr. Sullivan does not even know when they went into effect or whether any other acts applied prior to their enactment, and did not consider it important to understand what laws and regulations were in place in the past. *See* Ex. 2 (Sullivan Dep., 173:21-174:18; 176:22-177:10).

⁷ For instance, based upon his understanding of these "guidelines and regulations," Dr. Sullivan concludes that "for pasture areas other than those which are hydrologically active, **I do not expect that much P** will be contributed by overland flow to streams under the more typical rainstorm conditions." *See* Ex. 1 (Sullivan Rpt., p. 79) (emphasis added). Notably, Dr. Sullivan does not say how much phosphorus from poultry waste he expects will be contributed from these areas during large storm events. Further, Dr. Sullivan does not say whether or not he expects that much bacteria would be contributed to the IRW from overland flow and he does not quantify the amount of bacteria or phosphorus contributed by poultry waste application in the IRW.

Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 590 (1993) ("knowledge" "connotes more than subjective belief or unsupported speculation").

The basis for Dr. Sullivan's opinions regarding runoff in the IRW are doubly dubious given that Dr. Sullivan has no real knowledge about the conditions in the IRW. For instance, Dr. Sullivan has not reviewed any research regarding the likelihood of overland flow in the IRW and is not "aware of any kind of definitive study" of the issue. *See* Ex. 2 (Sullivan Dep., 353:6-16). Dr. Sullivan does not even know if there is any area in the IRW that will not generate runoff of phosphorus:

Q. Are there areas within the Illinois River watershed which have application of phosphorus to the soil which never generate runoff of phosphorus?

A. I can't tell you that. I can't answer that.

See Ex. 2 (Sullivan Dep., 346:24-347:2). Further, Dr. Sullivan did not attempt to confirm his belief about land application in the IRW by investigating actual practices in the IRW. He did not quantify the amount of poultry waste generated, identify land application areas, and did not investigate soil test phosphorus levels. *See* Ex. 2 (Sullivan Dep., 398:17-25; 399:11-401:15). And, he does not know whether there is an upper STP limit that applies to all pastures on which poultry waste is applied in Arkansas or Oklahoma.⁸ *See* Ex. 2 (Sullivan Dep., 404:23-405:9).

⁸ One of the "guidelines and regulations" that makes runoff of bacteria and phosphorus unlikely in the IRW according to Dr. Sullivan is the phosphorus index. *See* Ex. 2 (Sullivan Dep., 370:24-371:16). However, he testified that he is unaware of research quantifying the effectiveness of the phosphorus index, but that he believes it is intended to prevent or reduce phosphorus runoff. *See* Ex. 1 (Sullivan Rpt., p. 80); *See* Ex. 2 Sullivan Dep. at 356:5-357:17; 359:8-12; 362:4-20). Defendants do not dispute this fact but argue that his opinion regarding the effectiveness of the phosphorus index in reducing phosphorus runoff is supported by the inclusion of the index in multiple government regulations. *See* Resp., p. 12. The fact that various forms of a phosphorus index have been adopted by 47 states does not mean that runoff of phosphorus and bacteria is unlikely in the IRW. *See* Resp., pp. 11-12, fn 6). Notably, Defendants do not cite anything for their bald assertion that "[p]hosphorus indices and other related regulations and guidelines are designed to prevent or minimize phosphorus movement from field to stream." *See* Resp., p. 12.

Significantly, Defendants do not argue that Dr. Sullivan's opinions are supported by reliable data, analysis and testing. Instead they argue that Dr. Sullivan has experience in the "concepts associated with runoff of constituents of land-applied livestock manure"⁹ and that his opinions are supported by his "prior research." *See* Resp., p. 12. Although Defendants acknowledge that Dr. Sullivan did not conduct **any** research or analysis in this case ". . . to determine the extent to which phosphorus, or any other constituent, does move from pasture to stream in the IRW . . .," they state that he has conducted research on ". . . fecal coliform elsewhere." *See id.* at 11. Defendants do not explain how research on fecal coliform "elsewhere" provides reliable data and analysis to support Dr. Sullivan's opinions on the likelihood or importance of runoff of phosphorus and bacteria in the IRW, especially in the absence of conducting any research or analysis on the subject in the IRW.

Simply put, for Dr. Sullivan to opine -- without **any** knowledge of the actual regulatory schemes in place and without **any** knowledge of the conditions and practices in the IRW other than his general sense-- that land-applied poultry waste is not likely an important source of pollutants is pure speculation. Dr. Sullivan's opinions regarding runoff of phosphorus and bacteria are unreliable and are not supported by any data, analysis or testing. Accordingly, Dr. Sullivan's testimony regarding runoff of phosphorus and bacteria should be excluded.

C. Defendants' arguments in support of Dr. Sullivan's bacterial comparisons are without merit

The State of Oklahoma has water quality standards for bacteria based on 30-day geometric means and on single sample values. Rather than compare apples to apples, Dr. Sullivan created his own 7-year geometric means and then compared them to a 30-day geometric

⁹ Dr. Sullivan has never done work in a watershed involving poultry waste. *See* Ex. 2 (Sullivan Dep., 166:5-16).

mean standard in an effort to draw conclusions about bacterial levels across Oklahoma. Dr. Sullivan thus ended up comparing apples to oranges. His methodology is flawed, and his analysis tells us nothing about whether bacteria levels are the same as, greater than, or less than other location in Oklahoma. The two relevant levels for comparison are 30-day geometric means or single sample values.

Defendants do not dispute that Oklahoma's water quality standards for bacteria are 30-day geometric means or that Dr. Sullivan failed to calculate 30-day geometric means when comparing bacteria levels across Oklahoma to the water quality standards. Rather, Defendants argue that it does not matter that Dr. Sullivan used samples collected over a seven-year period, rather than over a 30 day period, because he wasn't assessing "water quality violations." *See Resp.*, p. 13. This is because they assert Dr. Sullivan was "analyz[ing] spatial patterns in water quality data." *See id.*

The flaw in this "logic" is readily apparent. For example, if there are enough samples in the IRW to calculate 30-day geometric means for each month since 2002, but there are only 5 samples for the Arkansas River that were taken in 2003, Dr. Sullivan's approach would combine all of the data in the IRW into one geometric mean representing the entire seven year period and all of the data taken in 2003 from the Arkansas River into one geometric mean representing the entire seven year period. Dr. Sullivan would then compare the geometric means of the data from both waterbodies to determine if bacteria levels are similar. This calculation would show nothing about how bacteria levels in the IRW actually compare to the Arkansas River.¹⁰

¹⁰ Citing to paragraphs 5 and 6 of an affidavit from Dr. Sullivan (Defendants' Exhibit 6), Defendants argue that it is a "common practice" that spatial analysis of water quality are based upon samples collected over widely varying time periods, ranging from a few weeks or weeks to multiple decades. *See Resp.*, p. 4. In paragraph 6 of Exhibit 6, Dr. Sullivan lists a number of studies that he claims focused on spatial analysis of "water samples collected over various time

Defendants argue it does not matter whether Dr. Sullivan's analysis demonstrates water quality standards are exceeded. *See Resp.*, p. 13. According to Defendants, Dr. Sullivan was simply doing a spatial analysis to determine whether bacteria levels are high and cause for alarm. *See id.* However, it is simply not possible for Dr. Sullivan to determine whether bacteria levels are "high" or are "cause for alarm" without comparing the levels to the water quality standards that are designed to protect human health. These standards are either 30-day geometric means or single sample values. Further, Dr. Sullivan **did** use this analysis to determine whether water quality standards are exceeded. On page 20 of his Report, *see* Ex. 1, Dr. Sullivan concludes based on this analysis that "concentrations above standards of all three of the bacterial indicators addressed in the state's request for a preliminary injunction are found to be well distributed throughout Oklahoma (Figures 2-4 through 2-17)."

Defendants also argue that Dr. Sullivan was attempting to determine whether relatively high bacteria levels correspond spatially to available information on poultry density in Oklahoma. *See Resp.*, p. 13. Again, there is no way to know whether bacteria levels are high or not using Dr. Sullivan's methodology and, furthermore, it is not clear why Dr. Sullivan believes high bacteria levels should correspond to all areas with available information on poultry density. Surely, Dr. Sullivan's (flawed) methodology does not require that bacteria from poultry waste application has to be the source of high bacteria levels throughout Oklahoma in order to be the source of high bacterial levels in the IRW.

periods." *See Resp.*, Ex. 6, para. 6. While the studies cited collect data over various time periods, none of the studies cited compared data collected over more than 30 days (let alone, over seven years) to a water quality standard that is based on 5 samples collected over a 30 day period. *See, e.g.*, Ex. 4 (EPA, pp. 19-20, 23-24); Ex. 5 (Smith and Alexander (2006), pp. 639-41); Ex. 6 (Graham (2004), pp. 4395-98). (Three other studies cited are ones conducted by Dr. Sullivan and relate to stream-acid base chemistry, surface water acidification, and storm sampling from one watershed between 1996 and 2002. None of these studies compared data collected over a period of time to a standard that was based on a different period of time.)

Lastly, Defendants argue that Dr. Sullivan was attempting to determine whether concentrations of bacteria in the IRW are "more likely to exceed standard criteria" than are concentrations outside the IRW. *See id.* This argument is mystifying. If Dr. Sullivan is trying to determine whether bacteria levels in the IRW are more likely to exceed the water quality standards than areas outside the IRW he would need to compare 30-day geometric means or single sample values. His analysis provides no information on whether concentrations of bacteria exceed standards either inside or outside the IRW. *See Ex. 2 (Sullivan Dep., 289:23-290:2; 312:18-313:2).*

Defendants also argue that Dr. Sullivan's opinion comparing bacteria levels across Oklahoma are relevant to this case because it shows that bacteria concentrations in the IRW "are not unusually high in IRW streams as compared to streams elsewhere in Oklahoma" and "are not higher in portions of Oklahoma that have a substantial poultry industry, as compared with portions of Oklahoma that do not have a substantial poultry industry." *See Resp.*, p 16. As previously demonstrated, Dr. Sullivan doesn't know whether bacteria concentrations IRW are higher or lower in the IRW than in other parts of Oklahoma or in areas with or without a substantial poultry industry. Dr. Sullivan only knows the geometric mean of at least 5 samples collected over seven years in areas where such data was available. This knowledge does not provide any insight into the current bacterial levels in the waters of Oklahoma and it is not representative of bacterial levels across the State -- it is simply a mathematical exercise conducted where data happened to be available. Dr. Sullivan's work does not demonstrate whether bacteria concentrations are high because he did not compare the data to the water quality standards. Contrary to Defendants' argument, *see Resp.*, p. 15, Dr. Sullivan's analysis is of no relevance to the State's claim of damage to the IRW and has no bearing on whether an imminent

and substantial endangerment exists in the IRW. Further, none of the portions of Dr. Sullivan's Report cited by Defendants demonstrate that he recognizes that there can be different sources of pollution in different watersheds or explains why Dr. Sullivan believes it is relevant that other watersheds may also be polluted by bacteria. *See Resp.*, pp. 17-18.

Finally, Defendants assert that Dr. Sullivan did use thirty day geometric means to evaluate water quality violations. *See Resp.*, pp. 14-16. This argument misses the point. While Dr. Sullivan did review Oklahoma's 303(d) list and Beneficial Use Monitoring Program (BUMP) Reports, the State is not challenging his review of the State's classification. It is simply challenging the relevancy of his opinions based on that review. Based on the 303(d) list and the BUMP Reports, Dr. Sullivan concludes that failure to support the primary body contact recreation standard is common. *See Ex. 1 (Sullivan Rpt., p. 19)*. He reaches this conclusion although there are 33,221 miles of streams in Oklahoma and only 6,546 miles have been deemed as not supporting the primary body contact recreation beneficial use. *See id.* Dr. Sullivan's opinion that some streams that are listed as impaired by bacteria on the 303(d) list are not located in areas of concentrated poultry operations is simply irrelevant to the issue in this case. *See id.* (at p. 20). Poultry waste application can be a source, and in fact is a source, of bacteria even though it is not a source in every watershed in Oklahoma.

In sum, Dr. Sullivan's bacterial comparisons are neither based on sound scientific methodologies nor relevant. Therefore, under *Daubert* they must be excluded.

III. Conclusion

This Court should enter an order in limine precluding the opinion testimony of Dr. Sullivan.

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I certify that on the 19th day of June, 2009, I electronically transmitted the attached document to the Clerk of Court using the ECF System for filing and transmittal of a Notice of Electronic Filing to the following ECF registrants:

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